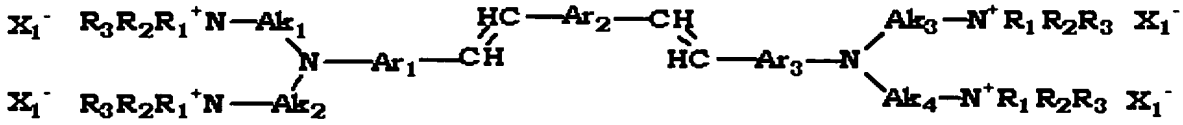
CLAIMS

What is claimed is:

1. A chromophore having the following structural formula (I):



(I)

wherein Ar_1, Ar_2 and Ar_3 are each independently a substituted or non-substituted aromatic hydrocarbon or aromatic heterocyclic ring; Ak_1, Ak_2, Ak_3 and Ak_4 are each independently a substituted or non-substituted alkyl or alkylene group; R_1, R_2 and R_3 are each independently a substituted or non-substituted alkyl group; and X_1 is a counter anion.

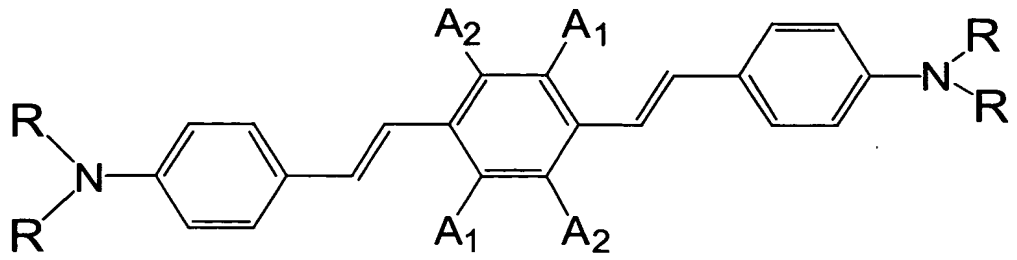
2. The chromophore of claim 1 wherein Ar_1, Ar_2 and Ar_3 are single aromatic rings.

3. The chromophore of claim 2 wherein Ar_1, Ar_2 and Ar_3 are benzene rings.

4. The chromophore of claim 1 wherein Ar_2 includes a donor or acceptor group.

5. The chromophore of claim 1 wherein Ak_1, Ak_2, Ak_3 and Ak_4 are each $(CH_2)_n$, where n is from 1 to 10, and R_1, R_2 and R_3 are each $CH_2)_m$-H, where m is from 1 to 10.

6. A distyrylbenzene chromophore having the following structural formula (II):



(II)

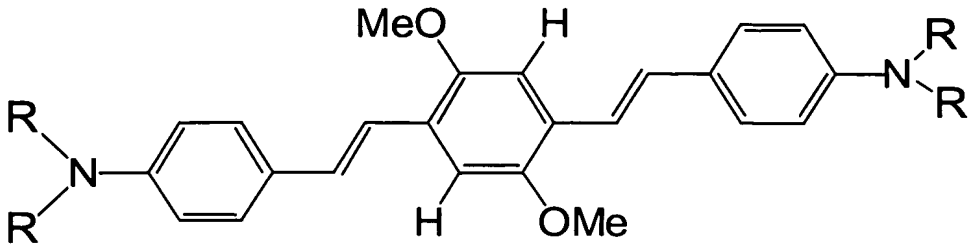
wherein A_1 and A_2 are each independently a hydrogen, or a donor or acceptor group; and R is $[(CH_2)_n]_6$-NR'_3X, where R' is $(CH_2)_m$-H, X is any anion, n is from 1 to 10 and m is from 1 to 10.

7. The chromophore of claim 6 in which the donor group is selected from the group consisting of I, Br, Cl, OC(O)R", SH, OH, SR", OR", NHC(O)R", NH_2, NH"R, S^-, and O^-, where R" refers to an alkyl group containing 1-50 carbon atoms.

8. The chromophore of claim 6 in which the acceptor group is selected from the group consisting of F, $C(O)NR"_2$, C(O)NHR", $C(O)NH_2$, C(O)OR", C(O)OH, C(O)R", C(O)H, CN, $S(O_2)R"$, and NO_2, and where R" refers to an alkyl group containing 1-50 carbon atoms.

9. The chromophore of claim 6 in which A_1 and A_2 are each hydrogen and n = 1.

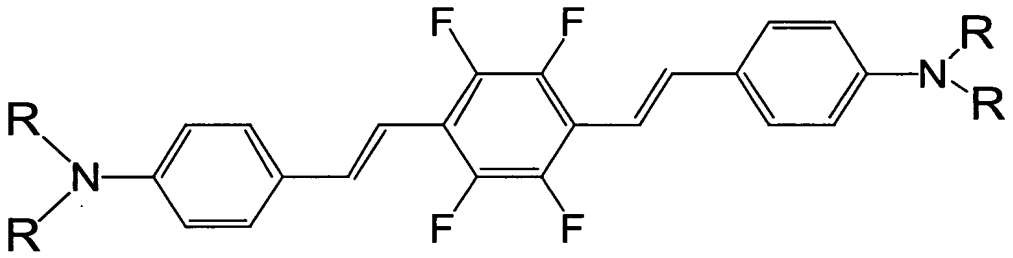
10. A distyrylbenzene chromophore having the following structural formula (III):



(III)

wherein R is $(CH_2)_6$-NR'_3X , R' is CH_3, and X is any anion.

11. A distyrylbenzene chromophore having the following structural formula (IV):



(IV)

wherein R is $(CH_2)_6$-NR'_3X, R' is CH_3 and X is any anion.

12. A method of preparing a distyrylbenzene chromophore, comprising reacting a 1,4-dibenzylphosphonate with a haloalkylamino-benzaldehyde and adding a trialkylamine by condensation to said distyrylbenzene chromophore whereby to provide water solubility to said chromophore.

13. The method of claim 12 in which said haloalkylamino-benzaldehyde is a N,N-bis-(6-iodoalkyl)-4-amino-benzaldehyde where the alkyl group has from 1 to 10 carbon atoms.

14. The method of claim 13 in which said N,N-bis-(6-iodohexyl)-4-amino-benzaldehyde is prepared by reacting N,N-bis-(6-hydroxyhexyl)-benzaldehyde with phosphorous oxychloride.

15. The method of claim 14 in which said N,N-bis-(6-hydroxyhexyl)-benzaldehyde is prepared by reacting aniline and 6-chloro-1-hexanol with a carbonate.

16. A method of preparing a water-soluble two-photon absorbing distyrylbenzene chromophore, comprising the following reaction: